MEDICAL PROCEEDINGS

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EDITORIAL · REDAKSIONEEL

PROFESSIONAL SECRECY

DISCLOSURE OF THE NATURE OF AN ILLNESS BY A MEDICAL PRACTITIONER TO A THIRD PARTY

The Medical Council has, during recent years, received an increasing number of inquiries from medical practitioners about their obligations to patients in connexion with the ethical rule regarding professional secrecy. The ethical rule (Rule 16) reads:

Divulging verbally or in writing any information which ought not to be divulged regarding the ailments of a patient except with the express consent of the patient or, in the case of a minor, with the consent of his guardian, or in the case of a deceased patient, with the consent of his next-of-kin or the executor of his estate.

Note: In a court of law, professional secrecy should be contravened only under protest after direction from the presiding judicial officer.

From this rule it is clear that the medical practitioner's obligations extend not only to patients under his care but also to deceased persons on whom he may have been in attendance during their lifetime.

OBLIGATIONS IN RESPECT OF LIVING PATIENTS

The Council has considered this problem specifically in relation to the issue of medical certificates and has expressed itself very explicitly as follows:

(*a*) A medical certificate to a third person shall not ordinarily disclose a diagnosis.

(*b*) A medical certificate disclosing a diagnosis may be given to a patient provided that the full

PROFESSIONELE GEHEIMHOUDING

OPENBARING VAN DIE AARD VAN 'N SIEKTE DEUR 'N MEDIESE PRAKTISYN AAN 'N DERDE PARTY

Gedurende die afgelope jare het die Geneeskundige Raad 'n steeds toenemende aantal navrae van mediese praktisyns ontvang oor hul verpligtinge teenoor pasiënte vir sover dit die etiese reël in verband met professionele geheimhouding betref. Die etiese reël (Reël 16) lui soos volg:

Die bekendmaking van enige besonderhede, hetsy mondelings of skriftelik, aangaande die siektes van 'n pasiënt wat nie bekend gemaak behoort te word nie behalwe met die uitdruklike toestemming van die pasiënt of, in die geval van 'n minderjarige, met die toestemming van sy voog, of, in die geval van 'n pasiënt wat oorlede is, met die toestemming van sy naasbestaande of die eksekuteur in sy boedel.

Opmerking: In 'n geregshof mag die reël oor professionele geheimhouding alleenlik onder protes, en wanneer daartoe gelas deur die voorsittende regterlike amptenaar, verbreek word.

Uit hierdie reël is dit duidelik dat die mediese praktisyn 'n verpligting het nie alleen teenoor die pasiënte wat hy behandel nie, maar ook teenoor oorlede persone wat gedurende hul leeftyd deur hom behandel is.

VERPLIGTINGE T.O.V. NOG-LEWENDE PASIËNTE

Die Raad het oorweging aan hierdie probleem verleen spesifiek vir sover dit betrekking op die uitreiking van mediese sertifikate het, en het die volgende uitspraak gegee:

implications of such certificate have been explained to the patient.

(*c*) Any medical certificate or report may be handed to a third person with the written consent of the patient; such consent to be obtained at the time when the certificate is issued.

Consents and authorizations not signed at the time of the request for a certificate, should not be considered binding on the practitioner from whom the certificate is requested; similarly, where the medical practitioner is of opinion that the patient might have signed a consent under duress or misapprehension, he should exercise his discretion and judgment before disclosing information concerning the patient to a third party.

It is important to preserve to the very fullest extent the completely confidential relationship between the doctor and his patient. No patient should ever, in any circumstances, have the slightest doubt about his ability to rely utterly on the trust which he places in his doctor.

However, a distinction must be drawn between the normal doctor-patient relationship (which exists, e.g. when a member of a Medical Aid Society seeks medical care because he is ill) and the quite different relationship which is brought into being when a *person* presents himself for examination and report because he wishes to join the public service, take out an insurance policy, etc. This situation has been discussed by Masters and Shapiro[1] as follows:

LIFE INSURANCE EXAMINATION

The practitioner called upon to examine a proposer for a life insurance policy should remember that he is performing the examination at the instance of the assurance company, and that his fee is paid by the company. The person who presents himself for examination is doing so at the request of the company, and the usual relationship of patient and medical practitioner is not created. The examination is being undertaken so that certain facts can be communicated to the company for the specific reason of deciding whether to issue a policy or not. The practitioner should not, therefore, give any information about the nature of his findings to the patient. Not infrequently it happens that the company, from other information at its disposal, declines the proposal which the practitioner has considered quite safe. If, after the life has been passed by the examiner and the proposer is told this at the time, the assurance is declined by the company, the reports of the personal referees whose names the client has given may be suspected by him, and trouble may arise between friends in this way.*

Occasionally, when a proposer has some gross temporary or permanent defect, or is intemperate, the practitioner may be asked by the proposer not

(*a*) 'n Geneeskundige-sertifikaat aan 'n derde persoon moet gewoonweg nie 'n diagnose bekend maak nie;

(*b*) 'n Geneeskundige-sertifikaat wat 'n diagnose bevat mag aan 'n pasiënt gegee word met dien verstande dat die volle implikasies van sodanige sertifikaat aan die pasiënt verduidelik is;

(*c*) Enige geneeskundige-sertifikaat of verslag mag aan 'n derde persoon oorhandig word met skriftelike toestemming van die pasiënt; sodanige toestemming moet verkry word by uitreiking van die sertifikaat.

Toestemmings en magtigings wat nie tydens 'n versoek om 'n sertifikaat geteken is nie, kan nie as bindend beskou word jeens die praktisyn van wie die sertifikaat verlang word nie; eweneens waar 'n praktisyn van mening is dat die pasiënt skriftelike toestemming onder dwang of 'n misverstand gegee het, moet die praktisyn sy oordeel en diskressie gebruik alvorens hy inligting aangaande die pasiënt aan 'n derde persoon verstrek.

Dit is van groot belang dat die volkome vertrouelike verhouding tussen die dokter en sy pasiënt in die volste mate in stand gehou moet word. In geen omstandighede hoegenaamd behoort enige pasiënt ooit die geringste twyfel te koester oor sy vermoë om volkome staat te maak op die vertroue wat hy in sy dokter stel nie.

'n Onderskeid moet egter gemaak word tussen die normale dokter-pasiënt-verhouding (wat bv. bestaan as 'n lid van 'n Mediese Hulpvereniging vir mediese behandeling na 'n dokter kom omdat hy siek is) en die heeltemal ander verhouding wat geskep word as 'n *persoon* hom vir 'n mediese ondersoek en verslag by 'n dokter aanmeld omdat hy by die staatsdiens wil aansluit, of 'n versekeringspolis wil aangaan, ens. Hierdie toestand word soos volg deur Masters en Shapiro[1] bespreek:

ONDERSOEK VIR LEWENSVERSEKERING

Die praktisyn wat gevra word om 'n aansoeker om 'n lewensversekeringspolis te ondersoek, moet onthou dat hy die ondersoek op aandrang van die versekeringsmaatskappy doen, en dat die geld wat hy daarvoor vra, deur die maatskappy betaal word. Die persoon wat hom vir ondersoek aanmeld, doen dit op versoek van die maatskappy, en die gewone verhouding tussen pasiënt en mediese praktisyn word nie geskep nie. Die ondersoek word gedoen sodat sekere feite aan die maatskappy meegedeel kan word met 'n spesifieke doel, nl. om te kan besluit of 'n polis uitgereik moet word al dan nie. Die praktisyn behoort derhalwe geen inligting oor die aard van sy bevindings aan die pasiënt te verstrek nie. Dit gebeur nogal dikwels dat dit maatskappy, aan die hand van ander inligting waaroor hy beskik, 'n aansoek wat die praktisyn as heeltemal veilig beskou, van die hand wys. Indien die lewe deur die ondersoeker goedgekeur word, en die aansoeker word hiervan verwittig na afloop van die ondersoek, en as die versekering dan later deur die maatskappy van die hand gewys word, kan die aansoeker agterdog begin koester op die verslae van die persoonlike skeidsregters wie se name hy verstrek het, en op hierdie manier kan daar moeilikheid tussen vriende ontstaan.*

Af en toe, as die aansoeker aan die een of ander voor die hand liggende kwaal ly, of as dit duidelik

* No third party should be present at the examination of the proposer.

1. Masters, N. C. and Shapiro, H. A. (1949): S. Afr. Med. J., **23**, 267.

1. Masters, N. C. en Shapiro, H. A. (1949): S.-A. Tydsk. vir Genees., **23**, 267.

to send in his report, but to tear it up because the proposal will be withdrawn and the proposer will pay the fee himself. This must not be done. The report should always be handed to the office concerned. The responsibility for tearing up the report then rests with the company, for if one be torn up by the practitioner, the proposer can say that he has never withdrawn a proposal or been refused a policy, and a safe check which insurance companies have on subsequent misstatements is lost.

The medical practitioner, as has been noted, acts for the insurance company who pays the fee and he is only concerned in reporting to it. He is, of course, under no obligation to tell the client anything about his findings, and in fact should not do so, nor is he under any obligation to give him personal advice, as he is not infrequently asked to do.†

OTHER EXAMINATIONS

The same considerations should guide the practitioner when called upon to undertake what might be called 'formal' examinations, e.g., applicants for the civil service, or soldiers claiming disability pensions. These examinations are undertaken at the request of some authority, which may also pay the fee for the specific purpose of ascertaining some certain limited facts regarding the applicant's state of health. The contract is between the practitioner and the authority on whose behalf he is performing the examination, and therefore no duty to observe professional secrecy, in as far as that authority is concerned, exists. Further, the person who consents to the examination is acquainted with the fact that the findings will be communicated to the authorizing body and by his submission to the examination tacitly or expressly consents to this being done.

OBLIGATIONS IN RESPECT OF DECEASED PATIENTS

Professional obligations of secrecy concerning the ailments of deceased patients are not as widely known throughout the profession as they deserve to be. According to the ethical rule, a medical practitioner who has attended a deceased patient cannot divulge information about such a case other than the statutorily required information 'except with the consent of his (the deceased's) next-of-kin or the executor of his estate.'

The phrase 'next-of-kin' has been given a meaning in South Africa in the interpretation of wills.[2] It is not clear whether it is this meaning which is referred to in the ethical rule or, indeed, whether the phrase 'kin' refers to one relative or more. If the ordinary dictionary meaning is to be given to the term, the result will be the exclusion of the surviving spouse

† E. M. Brockbank: *The Conduct of Life Assurance Examinations*, Lewis & Co., London, 2nd ed., p. 20.

2. *In re* Scallan's Estate. 1954 [3]. S.A. 282.

is dat hy 'n onmatige persoon is, kan hy die praktisyn vra om geen verslag in te stuur nie, of om dit op te skeur omdat hy van plan is om sy aansoek terug te trek en self die doktersgelde sal betaal. Dit moet nie gedoen word nie. Die verslag moet altyd aan die betrokke kantoor terugbesorg word. Die verantwoordelikheid vir die opskeur van die verslag gaan dan op die maatskappy oor, want as so 'n verslag deur 'n praktisyn vernietig word, kan die aansoeker maklik sê dat hy nog nooit 'n aansoek teruggetrek het en dat hy nooit 'n polis geweier is nie. Op hierdie wyse kan die veilige beheer wat versekeringsmaatskappy oor latere wanvoorstellings het, verlore gaan.

Die mediese praktisyn, soos ons reeds gesê het, tree op namens die versekeringsmaatskappy wat sy gelde betaal, en sy enigste belang by die saak is om verslag aan die maatskappy te doen. Daar rus natuurlik geen verpligting op hom om iets oor sy bevindings aan die kliënt te vertel nie. Trouens, hy behoort dit nie te doen nie. Hy is ook nie verplig om persoonlike advies aan die kliënt te gee soos hy dikwels gevra word om te doen nie.†

ANDER ONDERSOEKE

Dieselfde oorwegings behoort as leidraad vir die praktisyn te dien wanneer hy gevra word om wat miskien 'formele' ondersoeke genoem kan word, in te stel, d.w.s. die ondersoek van persone wat tot die staatsdiens wil toetree, of soldate wat aanspraak op ongeskiktheidspensioene maak. Sodanige ondersoeke word ingestel op versoek van die een of ander owerheid, wat waarskynlik ook die doktersgelde sal betaal, met die spesifieke doel om sekere beperkte feite oor die aansoeker se gesondheidstoestand te wete te kom. Die kontrak is tussen die praktisyn en die owerheid namens wie die dokter die ondersoek instel, en derhalwe rus daar geen verpligting op die praktisyn om professionele geheimhouding te bewaar vir sover dit hierdie owerheid betref nie. Temeer, die persoon wat hom vir so 'n ondersoek aanmeld, is wel deeglik bewus van die feit dat die bevindings aan die magtigingsowerheid meegedeel sal word, en deur hom aan so 'n ondersoek te onderwerp, gee hy stilswygend of uitdruklik toestemming dat dit gedoen kan word.

VERPLIGTINGE T.O.V. OORLEDE PASIËNTE

Die professionele verpligtinge t.o.v. geheimhouding vir sover dit die kwale van oorlede pasiënte betref, is nie so goed onder lede van die professie bekend as wat hulle behoort te wees nie. Volgens die etiese reël kan 'n mediese praktisyn wat 'n oorlede pasiënt behandel het geen informasie oor so 'n geval, met uitsondering van die statutêr vereiste inligting, verstrek nie ‚behalwe met die verlof van sy (die oorledene se) naasbestaande of die eksekuteur van sy boedel.'

Die woord ‚naasbestaande,' of ‚next-of-kin' soos dit in die Engelse weergawe van die Reël heet, het 'n betekenis in Suid-Afrika verkry in die vertolking van testamente.[2] Dit is nie duidelik of daar na hier-

* Geen derde party behoort teenwoordig te wees tydens die ondersoek van die aansoeker nie.

† E. M. Brockbank: *The Conduct of Life Assurance Examinations*, Lewis & Co., Londen, 2de uitgawe, bl. 20.

2. *Insake* Scallan se Boedel. 1954 [3] S.-A. 282.

from the scope of the rule.[3] If the meaning is plural, must the consent be given by all the next-of-kin? If it is singular, which relative takes precedence in the right to give consent?

In situations in which the testamentary capacity of the deceased may become an issue, doctors may find themselves in considerable difficulty in interpreting what their obligations are, especially as there may be a conflict of interests between different relatives who may be heirs under a will in dispute. In such circumstances it would certainly seem desirable for the practitioner to confer at least with the executor of the estate.

If the rule is to be retained in its present form (and the value of doing so is certainly dubious) then it will be of great assistance to all concerned if a clear and well-defined meaning were given to the phrase 'next-of-kin,' so that practioners will be in no doubt about which persons are entitled to give consent to the disclosure of information about deceased patients.

3. *The Shorter Oxford English Dictionary*, 3rd ed., 1956, defines 'next-of-kin' as 'the person (or persons) standing nearest in blood-relationship to another, and entitled to share in his personal estate in case of intestacy.'

die betekenis verwys word in die etiese reël, en/of die Engelse woord ‚next-of-kin' (‚naasbestaande') op een familielid of meer betrekking het nie. Indien die gewone woordeboekbetekenis aan die Engelse woord geheg word, sal die oorlewende gade van die bestek van die reël uitgesluit word.[3] As die woord in die meervoud vertolk word, sal dit dan nodig wees om die verlof van alle naasbestaandes te verkry? As dit in die enkelvoud is, watter familiebetrekking geniet voorrang wat betref die reg om verlof toe te staan?

In toestande waar die testamentêre bevoegdheid van die oorledene 'n twisappel is, kan dokters heelwat moeilikheid ondervind met die vertolking van hul verpligtinge kragtens hierdie seksie van die etiese reël, veral as daar 'n botsing van belange is tussen verskillende familiebetrekkinge wat erfgename onder 'n gedisputeerde testament is. In sulke omstandighede lyk dit vir ons wenslik vir die praktisyn om oorleg ten minste met die eksekuteur te pleeg.

As die reël in sy huidige vorm behou moet word (en die waarde van so 'n behoud is baie twyfelagtig) sal dit van groot hulp wees vir almal wat by die saak betrokke is indien 'n duidelik en goed gedefinieerde betekenis aan die Engelse woord ‚next-of-kin' (‚naasbestaande') geheg word sodat daar by praktisyns geen twyfel kan bestaan oor watter persone geregtig is om verlof te gee vir die openbaarmaking van inligting oor oorlede pasiënte nie.

3. *The Shorter Oxford English Dictionary*, 3de uitgawe, 1956, omskryf 'next-of-kin' as 'the person (or persons) standing nearest in blood-relationship to another, and entitled to share in his personal estate in case of intestacy.'

ABSTRACTS

SERUM PROTEIN LEVEL AND NEPHROTIC SYNDROME

In order to find an explanation for the effect exerted by drugs on protein elimination in chronic renal diseases, albumin excretion was investigated following the administration of prednisolone and human albumin and following various combinations of these two substances in 7 patients with nephrotic syndrome. In the case of the patients who received only prednisolone (40 mg. daily), albumin excretion diminished. Where the patients were given albumin intravenously, urinary protein levels rose considerably, but fell quickly again following the addition of prednisolone. Where the patients received an injection of albumin after some 14 days' pre-treatment with prednisolone, the rise in urinary protein excretion was much less pronounced.

The results of the investigations suggest that prednisolone can reduce protein excretion for some considerable time in cases of nephrotic syndrome. Human albumin alone provokes an increase in protein excretion. Additional prednisolone can suppress the increase in protein excretion brought about by albumin, with the result that part of the human albumin administered can be made responsible for the increase in total serum protein. It thus appears that in nephrotic syndrome treatment with human albumin following appropriate pre-medication with prednisolone is the best method of producing a rise in the serum protein levels.

[Lachnit, V., Reinhardt, F. and Tretenhahn, W. (1958): Med. Klin. (G.), **53**, 1688].

HAEMODYNAMIC STUDIES IN MYOCARDIAL INFARCTION

Haemodynamic conditions following myocardial infarction were studied at the University Medical Clinic, Bergen. It was possible to observe 35 patients in the initial stage of an attack, i.e. on the average 39 hours after its onset. The 27 patients who survived the consequences of the infarction were subjected approximately 3 weeks later to a second examination using the same method (Evans blue dilution). Analgesics, anticoagulants, oxygen, aminophylline, etc. were used as therapy.

Where the myocardial infarction was mild or moderately severe, the two examinations yielded roughly the same findings, and the values were within normal limits. In the severe cases, however, which were accompanied by pulmonary stasis, fall in blood pressure, tachycardia, and poor general condition, the cardiac minute volume, stroke volume, and circulatory velocity were reduced; the differences in comparison with the other group of patients could be regarded as statistically significant. The values obtained in the case of patients who failed to survive the attack proved to be particularly pathological; here, the minute volume averaged only 3 litres. In the case of the severely ill patients, the second examination admittedly revealed an appreciable tendency towards normalisation, but the deviations from normal values were still significant.

[Broch, O. J., Humerfelt, S., Haarstad, J. and Myhre, J. R. (1959): Amer. Heart J., **57**, 522].

THE SIZE OF THE LATERAL VENTRICLES OF THE BRAIN

WITH PARTICULAR REFERENCE TO THE EVALUATION OF CEREBRAL ATROPHY*

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On X-ray examination the brain is indistinguishable from the cerebro-spinal fluid which surrounds it and fills its cavities, the ventricles. When this fluid is replaced by gas (air- or pneumo-encephalography), the shadow between the ventricles and the surface represents the brain, and its size is indirectly evaluated from the size of the ventricles and/or of the subarachnoid space.

ANATOMY AND PATHOLOGICAL ANATOMY

Fig. 1A shows the normal anatomy diagrammatically. The lateral ventricles (V) are within the brain, and the film-width subarachnoid space (Sa) envelopes it and extends into the narrow sulci (Su). In Fig. 1B there is gross cerebral atrophy. The ventricles (V) are enlarged, the subarachnoid spaces on the surface (Sa) and in the sulci (Su) are wide and the brain is shrunken.

Atrophy may be localized to a part or the whole of a hemisphere or it may be generalized. It may be cortical (i.e. of the surface) or central (i.e. involving the inner substance).

There are 2 types of cortical atrophy with a wide surface subarachnoid space:

i. A type with small gyri (or convolutions) with widened sulci; and

ii. A type with flat gyri and narrow sulci. It is doubtful, however, whether the second type occurs without central atrophy.

In central atrophy the ventricles dilate and the subarachnoid space remains normal. Often central and cortical atrophy are present together.

Dilatation may be due to causes other than atrophy, and atrophy itself may be due to many causes other than trauma. These are usually excluded on clinical and laboratory findings.

VENTRICULAR MEASUREMENTS

The diagnosis of cerebral atrophy rests in part on the size of the ventricles. Attempts have therefore been made to determine the normal

* Being the substance of a lecture delivered by Dr. H. Jackson at the Second South African Medico-Legal Congress in Durban in July 1960.

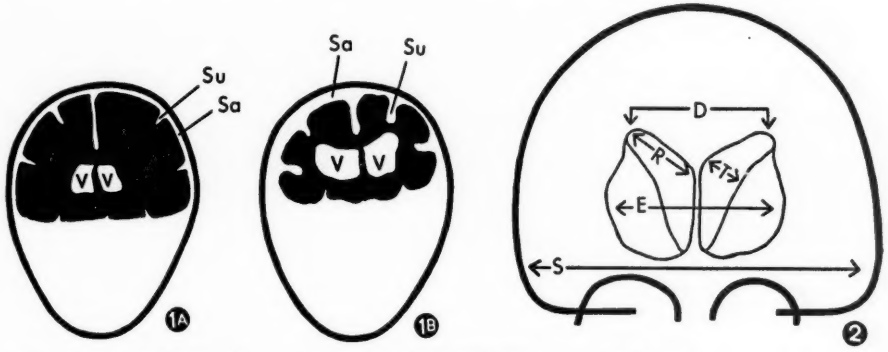

Fig. 1. V: Lateral ventricle. Sa: Surface subarachnoid space. Su: Sulcus.

Fig. 2. Commonly made measurements in the supine A–P Air encephalogram
D: Spread of the roofs. E: Spread of the anterior horns. T: Thickness of the body.
R: Width of the roof. S: Maximum internal diameter of the skull.

range. These attempts fall into 2 groups:

(*a*) *In vivo studies,* by air encephalography; and

(*b*) *Post-mortem studies,* on ventricular casts.

(*a*) Air encephalography is not performed on normal subjects. The cases for measurement must therefore be selected. As size *per se* is one of the main criteria of selection, the final result reflects the author's opinion or experience expressed in numerical terms rather than the actual normal range. This expression of opinion, correctly interpreted, is valuable; but it is neither infallible nor precise.

(*b*) Last and Tompsett[1] measured casts made from an unselected group of 24 autopsy specimens. Although this series is small it was selected for normality on anatomical and histological appearances. It is therefore important to ascertain whether it can be used as a basis for clinical assessment.

As a first approximation we measured 70 cases that we had selected as normal and compared our average measurements (corrected for radiographic distortion) with theirs (Table 1).

TABLE 1: AVERAGE MEASUREMENTS (MM.)

Measurement	*Last & Tompsett*	*Present Series*
D	30	28
E	33	35
T	6·4	8·7
R	15·5	14

The dimensions measured are illustrated in Fig. 2, viz.:

D: Spread of the roofs.
E: Spread of the anterior horns.
T: Thickness of the body.
R: Width of the roof.

The differences, where they are significant, are interesting and can partly be explained thus:

D and R: Our averages are smaller because we excluded more cases with large ventricles in selecting our series.

E: Our average is larger because in about 8% of cases the anterior horns were too small to cast sufficiently defined shadows for measurement.

T: We do not yet have a satisfactory explanation for this difference and, for the present, prefer our figure of 10.4 mm. [σ = 2.5] to Last and Tompsett's.

If we assume that Dyke and Davidoff's range of 35 to 45 mm. for D has a mean of 40 mm. and correct this for radiographic magnification, it becomes 32 mm.

RATIOS

Large ventricles may occur normally in small brains and *vice versa.* Our average ratios of the size of the ventricles to that of the skull are compared with those of Last and Tompsett's in Table 2. These ratios are not subject to significant radiographic distortion and they are particularly applicable when the distortion is unknown. The normal range is shown in Tables 3 and 5.

TABLE 2: AVERAGE RATIOS

Ratio	*Last & Tompsett*	*Present Series*
D:S	0·22	0·22
E:S	0·26	0·27

TABLE 3: MEASUREMENTS AND RATIOS

Measurement or Ratio	*Average*	*Standard Deviation*
D	30 mm.	5·1 mm.
E	33 mm.	5·2 mm.
T	6·4 mm.	2·5 mm.
R	15·5 mm.	3·0 mm.
D:S	0·22	0·044
E:S	0·26	0·034

Derived from Last and Tompsett[1]

TABLE 4: SHOWING THE PROBABILITY OF PICKING A SAMPLE AT RANDOM

t	1·0	1·25	1·5	1·75	2·0	2·25	2·5	2·75	3·0
p	·159	·106	·067	·040	·023	·012	·006	·003	·001

$$t = \frac{a - x}{s}$$, where a = Average;
x = The sample;
s = Standard deviation; and
p = The probability.

From M. J. Moroney

AVERAGES AND THEIR SIGNIFICANCE

From these average measurements and ratios we believe that Last and Tompsett's figures for D, E and R, and the ratios D:S and E:S derived from their work, are applicable *in vivo,* and that a normal range may therefore be derived from their results.

THE NORMAL RANGE

Analysis of our figures and of those of Last and Tompsett shows a good approximation to a normal frequency distribution.

The (corrected) figures for the upper limits of normal given by different authors are about 1 standard deviation above Last and Tompsett's means, e.g. D=36 mm.[3] and E:S=0.29.[4] Our own series includes very few cases beyond this range. It thus appears that clinicians usually take as the upper limit of normal a measurement that is 1 standard deviation above the mean.

The probability of selecting by chance a case having measurements more than 1 standard deviation above the mean decreases rapidly beyond this point, and it can be calculated from Tables 3 and 4. For example, if D=38 mm., it is 1.5 standard deviations above the mean, and the probability of selection by chance alone is 0.067, i.e. 1 in 15. This does not mean cerebral atrophy but the probability can be weighed with the other medical and non-medical probabilities of the case.

THE 24-HOUR DELAYED EXAMINATION

It has been demonstrated convincingly[6] that cerebral atrophy may more easily be demonstrated 24 hours after the injection than immediately, as dilatation of the ventricles follows the subsidence of oedema induced by the air. In our experience this does not occur in normals, and it is uncommon even in the presence of atrophy, possibly because the small amounts of air we use do not induce oedema.

TIME OF DEVELOPMENT OF POST-TRAUMATIC ATROPHY

Dilatation of the ventricles is known to occur as early as the day after an injury. We think this cannot be due to cerebral atrophy. It is probably due to irritative or obstructive phenomena related to blood or protein in the ventricles, or to altered circulatory dynamics. Atrophy is an almost certain sequel in such cases.

TABLE 5: THE PROBABILITY OF SELECTING BY CHANCE A CASE HAVING A PARTICULAR MEASUREMENT

D	36	42	43·5	45	46·5	48	49·5	51	53
E	40	46	47·5	49·5	51	52·5	54	55·5	57
T	10·4	13	13·5	14	15	15·5	16	16·5	17·5
R	18·4	22	23	24	25	25·5	26·5	27·5	28·5
D:S	0·22	0·265	0·275	0·285	0·295	0·31	0·325	0·335	0·345
E:S	0·26	0·29	0·30	0·31	0·32	0·33	0·335	0·345	0·355
C	2	6	9	15	25	45	85	165	335

Table 5 has been prepared using Last and Tompsett's figures for D, E and R, and our own for T, multiplying by the radiographic magnification factor applicable to our particular conditions. viz. 36/30, i.e. for an F.F.D. (focus film distance) of 36″, an O.D.F. (object film distance) of about 6″, for an AP supine projection with the patient's head resting on the table top without a pillow) and calculating from Table 4.

C is the number of cases in which the measurement or ratio in the same column is likely to appear, e.g. the chance of selecting a case with the measurements in column 2 is 1 in 6, i.e. one in 6 normal people will have these dimensions.

In Table 5 the probabilities are given for one commonly used radiographic technique.

Ventricles which are within one standard deviation of the mean are not necessarily normal, for before the onset of cerebral atrophy they may have been one standard deviation or more smaller than the mean.

QUANTITY OF AIR

We measured the lateral ventricles in 6 cases after lumbar injection of 15 and 35 c.c. of air. We also measured the ventricles before and after partially emptying them of air without finding any significant difference. Stowell[5] did complete air replacement using an average of 118 c.c.; he obtained an average for D of 30 mm. (corrected for estimated distortion). We therefore conclude that the quantity of air injected in encephalography does not materially affect the size of the ventricles.

OBSERVER ERROR

Measurements by the same observer at different times, and by different observers, were found to vary as shown in Tables 6 and 7. These differences are small in the very cases in which the significance of large ventricles may be in

dispute, and they thus do not appear to constitute a practical problem.

TABLE 6: ONE OBSERVER'S DIFFERENCES ON TWO OCCASIONS (21 CASES)

Difference (In Mm.)	*Number of Cases*				
	D	E	T	R	S
0	14	14	16	10	10
1	7	6	5	11	6
2	0	1	0	0	3
3	0	0	0	0	1
4	0	0	0	0	0
5	0	0	0	0	1

TABLE 7: TWO OBSERVERS' DIFFERENCES (21 CASES)

Difference (In Mm.)	*Number of Cases*				
	D	E	T	R	S
0	11	11	11	8	8
1	6	7	10	11	8
2	4	3	0	2	4
3	0	0	0	0	0
4	0	0	0	0	0
5	0	0	0	0	1

TECHNICAL ERROR

It was difficult to be sure whether differences obtained with slightly different projections were due to observer error or to the technique, but in these cases such difference was insignificant where the ventricles were large and the end-points easy to define.

DIFFERENCES ON THE TWO SIDES

These are shown in Table 8. The dimensions most easily measured are E and E : S, and these are also the least asymmetrical. We do not really know what difference between the 2 sides is normal. However, we believe (on the basis of our own observation as well as on that of Last and Tompsett's study) that a difference of 5 mm. in the length of the anterior horns as measured in the supine lateral view, is abnormal.

CONCLUSION

We have attempted to show that:

1. In assessing cerebral atrophy from the size of the lateral ventricles, the statistical approach provides a method of weighing the probabilities that should be of value in medico-legal cases; and

2. Last and Tompsett's measurements for D, E and R in the antero-posterior view are applicable *in vivo* when due allowance is made for radiographic distortion.

Our figures, being derived in part from a small series of cases and in part from a selected series, must necessarily be an approximation; but we believe the data to be of practical value.

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TABLE 8: PERCENTAGE OF CASES SHOWING A DIFFERENCE BETWEEN THE TWO SIDES*

Difference (In Mm.)	T		R		E′	*Difference in Ratio*	E′ : S′
	L & T	J & L	L & T	J & L	J & L		J & L
0	54	22	33	11	37	·00	50
1	25	14	12	37	25	·01	25
2	17	20	21	23	32	·02	20
3	4	15	8	15	4	·03	4
4	0	2	12	4	0	·04	0
5	0	0	12	4	0	·05	0
6	0	0	0	4	0	·06	0

L & T: Last and Tompsett (24 cases).
J & L: Present series (56 cases).

For the purpose of this Table, E′ was measured separately for the 2 sides as the distance between the lateral extremity of the anterior horn and the septum pellucidum. The ratio E′ : S′ was determined using the value S/2 for S′.

*Some of the totals are less than 100% because decimal fractions have been omitted.

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MEDICO-LEGAL SECTION

DEATH FROM ARALEN POISONING

IN THE SUPREME COURT OF SOUTH AFRICA
(WITWATERSRAND LOCAL DIVISION)
JOHANNESBUR, 30 AUGUST 1960
REGINA v. I. M. H.

JUDGMENT

STEYN, J.: The accused in this matter is charged with the crime of culpable homicide. It is alleged that on 18 October 1959 and at Johannesburg he wrongfully and unlawfully killed Martha Catharina Erasmus, a European female child of approximately 4 years of age. During the course of the trial certain facts were admitted by the defence, and other matters became common cause. The cause of death of the deceased was one of the matters admitted and that is not in issue.

The deceased died at a result of chloroquine poisoning.

The accused is a chemist and it is common cause that he made up the prescription for the deceased. I shall refer to the circumstances in a moment. Mrs. Erasmus, mother of the deceased, stated that on 13 October 1959, she went to see her family doctor and discussed the question of the younger child with him, although she primarily visited him in regard to the older child of approximately 9 years of age. She mentioned to the doctor that the younger child was still suffering from an illness which he had previously treated, the doctor having prescribed, at that stage, two items in respect of the older child. He thereafter added a third item which is the item concerned in this case. In that third item, entered on the same prescription form, he prescribed the medicine for the younger child. The mother then apparently took the prescription to the accused's place of business, the prescription was made up and she received the medicine. She had been told by Dr. B., the family doctor, that the medicine for the younger child had to be administered in one dose. When she received the bottle containing 20 pills she apparently was surprised that it was expected that a child of four should take 20 pills in one dose, and she proceeded to her doctor. She says that in her presence the doctor telephoned, apparently, the accused. It is common cause that there was a conversation on the telephone between the accused and the doctor, although what was said in that conversation is in issue in the case. According to the mother she heard the doctor talking about 20 pills and about whether it contained, as she put it, 'bevat dit soveel gram'; in other words, the strength of the pills. She says that the doctor, as a result of this conversation, put the pills back in the bottle and told her that she should crush them and put them into syrup, whereupon she asked whether she could put it into tomato sauce and he told her that would be in order. She carried out those instructions and administered the pills in one dose to the deceased. Thereafter the deceased went outside to play but returned a little later and she took her to the bedroom where she noticed there was something peculiar about her eyes. She then telephoned Dr. B., who told her that she should again telephone him if the child did not improve. Later on she did so, and Dr. B. said she should take the child to hospital. The child subsequently died.

It is common cause that the child died as a result of the administering of these pills in this one dosage.

I pause for one moment to state that Dr. L., who was called by the Crown, described certain behaviour on the part of Dr. B. as 'illogical.' It seems to me that the only

logical behaviour in this case came from the mother who, as a layman, was surprised at the quantity of pills. She did what any parent would do in the circumstances and consulted the first expert—the doctor, who in turn consulted the second expert—the chemist, and as a result of what passed between them the mother left thinking that she had the advice of 2 experts. As a result of that she administered these 20 pills to her child. One wonders what more she could have done. However, I shall deal with that aspect later.

Dr. B. was the family doctor and he gave evidence to the effect that he had treated the deceased for tape-worm 4 to 6 months earlier and, although he had prescribed 2 different kinds of medicine, there had been no response. He says that on 13 October 1959, Mrs. Erasmus consulted him in regard to the elder daughter and he prescribed for that child according to the first 2 items on Exhibit 'A,' a prescription made out in his handwriting. He says that thereupon Mrs. Erasmus spoke about the deceased. Dr. B. says he had received from a firm called Winthrop Products a pamphlet sometime previously and as a result of that he worked out what dosage of a drug called Aralen he should prescribe in connection with a tape-worm complaint. He worked it out at 250 milligrams per 18 lb. body weight, and as the child weighed approximately 38 lb., he prescribed 500 milligrams of this drug Aralen. He wrote the prescription at the bottom of Exhibit 'A.' Dr. L. has told us that this is not really proper procedure, that is, filling in a prescription in connection with 2 patients on the same form. As, however, that in no way affected what happened later, I do not propose passing any comment in that regard. It may well be that it was not proper practice but I do not feel called upon to express any view because it does not affect the issue.

Continuing with Dr. B.'s evidence, he says that he told Mrs. Erasmus to give the medicine to the younger child in the morning and to follow it up later with a dose of castor oil or epsom salts. He says that regarding the dosage to be given on Exh. 'A,' he wrote: '500 mg. As directed,' because he told the mother to administer it in one single dosage, and on that prescription there was no possibility of an error, or over-dosage, because it was intended that the 500 milligrams should be administered in one dosage. It is common cause that that dosage was in no way dangerous, i.e. if the 500 milligrams were taken at one time. He says he expected the chemist to put on the label of the bottle '*As directed.*' He says 2 or 3 days later Mrs. Erasmus brought the bottle of tablets and he counted 20 which seemed to be rather a lot. He says he telephoned the accused and spoke to the accused. According to Dr. B. he asked the accused what he had dispensed and he said the accused informed him '25 milligrams each'; which, at 20 tablets would make 25 times 20, i.e. 500 milligrams as prescribed on Exhibit 'A.' He says he thereupon thanked the accused Dr. B. says that once he was satisfied from what the accused has told him, that the tablets were in fact 25 milligrams each, he told Mrs. Erasmus to crush them and to administer them to the child. He says he did not write down on the prescription the number of tablets because he did not know what strength the tablets were delivered in, or what strength of tablets the chemists imported. That is why he only wrote the total strength required on Exhibit 'A.' He says he did not tell the accused that the tablets were to be given in one dose because he was satisfied that the total dosage was correct, and it really did not concern any chemist how those pills were to be administered by reason of the fact that if 500 milligrams were administered in one dose nothing serious or dangerous would happen. It is common cause that this drug Aralen is used for malaria, amongst other things, as well.

There is nothing on Exhibit 'A' to indicate what the tablets in question were prescribed for, or how they were to be taken. There is a conflict of evidence between Dr. B. and the accused in regard to exactly what was said during this conversation which I have already mentioned, but I shall deal with that later. Dr. B. said in cross-examination that he told the accused that Mrs. Erasmus had brought him the bottle of tablets, and asked the accused what the strength was. He said that without hesitation the accused replied '25 milligrams.' Dr. B. denied that the accused said that he was reading from the bottle which had contained the tablets and that, according to that, the strength of the tablets was 0.25 gram and not 25 milligrams. He conceded, however, that if a child were to be treated for malaria a large number of pills would be required to be administered over a period of time and not in one dosage. Dr. B. conceded that he did not expect a child of 4 to swallow 20 tablets and that is why he told the mother to crush them and administer them in syrup or tomato sauce. He also conceded that he had no recollection of any pill of 25 milligrams.

What actually happened, and what is common cause, is that on the stock bottle from which the accused took these pills the strength was given in grams and was given as 0.25 gram. The accused admitted that in some way or another, he cannot now recollect how, he made a mistake and worked out that 20 of these pills were required to make up a total dosage of 500 milligrams. In fact, however, because these pills were 250 milligrams and not 25 milligrams, the making up of his prescription resulted in pills 10 times the strength prescribed being sent to Mrs. Erasmus.

The accused said that he remembers receiving Exhibit 'A' and attending to it in regard to the 3 items (the only one relevant is the third one for Aralen). He says he took it to be for the same child. I may just state here that nothing turns on that, because it was not suggested that if administered to the child of 9—which was apparently the age of the older child—it would not have resulted in death as well; in other words, the fact that it was intended for the younger child, although it appeared on the prescription for the older child, is not really of importance in this matter because the age is not the reason for the fact that the dose was fatal. The accused said he had dispensed Aralen before and he knew it was anti-malarial but he did not know that it was also used in cases of tape-worm. He said that when he dispensed the third item—he followed the order on Exhibit 'A'—he had the stock bottle which had been there when he took over the premises in 1955. He said that the strength given on Exhibit 2 was 0.25 gram and that he had not converted grams to milligrams frequently in the past. He said:

'I don't know how that mistake was made. Possibly I was influenced by the prescriptions of Aralen I had made up previously.'

He said that after the medicine had been sent out he received this telephone call from Dr. B. whom he did not know. According to the accused Dr. B. said: 'What did I prescribe for Mrs. Erasmus?'; whereupon he (the accused) said he would look and then he obtained the prescription form. When he came to the third item he said, 'Aralen, 500 milligrams,' and then he took the bottle, Exhibit 2, and read out from it '0.25 gram.' He says that Dr. B. then mumbled something on the other side of the line and said, 'All right.' He said he was not informed by Dr. B. that these pills were to be administered in one dose. He said that a pill of the strength of 25 milligrams would be of exceedingly small size—not very much more than a pinhead. He said that Aralen is only made up in this one strength of 250 milligrams. He said in cross-examination that he did not know how he made the mistake. He could not remember whether he read '5,000 milligrams' instead of '500 milligrams' which appears on Exhibit 'A.' Another possibility was that he may have read '25 milligrams' instead of '250 milligrams' on the bottle by reason of the fact that he may have read the figure 0.25 gram as .025 gram. He could not really say in which way this mistake was made; all that he said was that he admitted making a mistake and that it could have been made in any one of the ways suggested. He could not say which was the more likely. He said that when Dr. B. telephoned him he did not think that his dispensing was being queried. He said Dr. B. merely asked him what he had prescribed; that was some 2 or 3 days after he had made up the prescription. He said he thought Dr. B. wanted to refresh his memory. He disputed Dr. B.'s evidence about the conversation. It is a question of memory of course. Dr. B. also relied on his memory to recount the telephone conversation, in the same way as the accused did. It is in my view not necessary for me to decide whose memory is better in this case, but I would say this, that if one takes the conversation in its context, it seems to me that Dr. B.'s version is much more likely.

Mrs. Erasmus arrived at Dr. B.'s consulting room with the specific purpose of questioning Dr. B. in regard to the quantity of pills to be taken. Viewed in that light, it seems to me extremely unlikely that Dr. B. would have telephoned the accused to say, 'What did I prescribe?'. In that light it would have been more likely that he said, 'What about this Aralen?', or words to that effect. It is in fact common cause that according to the accused he (the accused) referred to the prescription and to the bottle containing the Aralen tablets. Then there is Mrs. Erasmus' evidence that she remembers that in this conversation 20 tablets were mentioned, and the strength. If the whole purpose of this visit by Mrs. Erasmus to Dr. B. was to ascertain whether 20 pills had to be administered in one dose and that, as a result of that, Dr. B. went to the trouble of telephoning the accused, it is hardly likely that he enquired, in order to refresh his memory merely, what he had prescribed. The whole trend of the enquiry would be directed to these 20 pills. In my view, therefore, the probabilities are that Dr. B.'s memory in regard to the conversation is better than that of the accused.

I do not, however, think it is essential for me to decide what was said in this conversation in view of the conclusion to which I have come.

It is on this evidence that Mr. *Maisels,* on behalf of the accused, addressed his argument to me, and Mr. *Masters,* on behalf of the Crown, submitted that the Crown had proved its case beyond a reasonable doubt. The defence, as I understand it, was really based on one main submission and that is that the admitted mistake of the accused in making up this prescription wrongly, was not the effective and proximate cause of the death of the deceased. Mr. *Maisels* submitted that on the evidence it was clear that the doctor told the mother to administer these pills in one dose, and he submitted that the real cause of the death of the deceased was the administering of these pills in one dose; in other words, the administering of an over-dose of 20 pills in one dose as a result of Dr. B.'s advice to the mother was the reason that the child died. Therefore, he argued, the effective cause of the death was not the mistake—arithmetical or otherwise—made by the accused in making up the prescription wrongly. Mr. *Maisels* submitted that the accused was not aware of the fact that these pills were to be administered at one time because he had no knowledge of that fact. That is common cause. In order to understand this defence one can perhaps give an example. The way I understand it, it really amounts, by analogy, to the following. If, as a result of the negligent driving of a motor-car by a person, somebody is injured and is taken to hospital and thereafter the nurse, on a cold night, negligently leaves a window open directly above the bed where the patient is lying and as a result thereof the patient contracts pneumonia and dies, then it can be argued that, although the negligent driving of the car may have been the cause of the patient being in hospital, nevertheless, and because the cause of death was pneumonia following upon the negligent act of the nurse, there is no nexus between the negligence which caused the patient to be in hospital and the negligence which caused his death. It is suggested that Dr. B.'s advice to the mother in this case to administer all the pills in one dose was the real effective cause of the death of the deceased and not the initial mistake made by the accused. In my view there is an inherent fallacy in that argument and that fallacy is this: the advice given by Dr. B. that all the tablets should be taken in one dose would have been perfectly correct if the prescription had been made up correctly. That advice was given on the assumption that the prescription was made up correctly. If the prescription had been made up correctly the advice would not have been wrong. It is only because the prescription had not been made up correctly that the advice given by Dr. B. transpired to be wrong. Perhaps one can illustrate it in this way: assuming for a moment that Aralen is supplied to chemists in strengths of a pill of 250 milligrams or a pill of 25 milligrams and the accused had made a similar error and supplied one pill of 250 milligrams instead of one pill of 25 milligrams, could it then be said that the pill of 250 milligrams erroneously supplied should have been broken up into ten little pieces and taken on separate occasions? The quantity of pills is not in issue, it is the strength thereof. The fact that the accused did not know that 20 pills were to be taken in one dose is irrelevant because had he made up the prescription correctly the fact that they were so taken would have been irrelevant as it would not have resulted in death. It was only because the prescription was made up incorrectly that the administering of 20 pills in a single dose resulted in the death of the deceased.

It seems to me that at best for the accused he could assume the following from the prescription: firstly, that it was intended for the older child—that, as I have said, has no bearing on the matter because the age was not a contributory factor in this case; secondly, that it was intended for malaria or any other illness —that is also irrelevant; and thirdly, that 500 milligrams was prescribed as the total dosage irrespective of how it was to be taken. The accused had no right to assume that it would be taken in separate dosages. If he was in doubt about the number of pills to be supplied he could have enquired. Dr. L. said it was part of the duty of a chemist to check on the dosage on the basis that if a doctor prescribes so many tablets of so many milligrams to be taken over so many days, the chemist, when he makes up the prescription, is able to calculate and ascertain if a mistake has been made and in that way see whether there is a possibility of an overdose. In this case there was a much less onerous duty on the accused because only the total dosage was specified, and one would expect great care in the making up of a prescription in these circumstances by reason of the fact that there were no other factors which required consideration or which could afford any guidance in regard to the possibility of an error on the part of the

medical practitioner; all that the prescription conveyed was that what was required was a total dosage of 500 milligrams Aralen and the accused had no right to assume anything further than that 500 milligrams of Aralen should be supplied, irrespective of how the dosage was to be administered. His duty was to make up the prescription according to what was written on it and all that what was written on the prescription conveyed was: 'Total dosage 500 milligrams Aralen.'

It seems to me that the entire defence was based on a submission to the effect that if the accused had known that the 500 milligrams were to be taken in one dose in the form of one tablet of 500 milligrams, there would have been no query because that dosage is not dangerous. But if he had known that the 500 milligrams were to be taken in one dose in the form of 20 tablets of 25 milligrams each, he would have been put on his guard. As I have said the fallacy of that submission lies simply in the fact that not the quantity of the tablets is in issue but the quality and strength, and that is where the mistake was made.

In my view the accused had a duty to make up this prescription in accordance with what was written on the prescription. He admits that he made a mistake, that instead of making up 500 milligrams he made up 5,000 and that is what resulted in the death of the deceased. I must express some astonishment at the conversation—whichever version is correct—between Dr. B. and the accused on the telephone. One would have expected a doctor to say to the accused: 'Have you any pills of greater strength because this has to be administered in one dose to a child of four?' Nothing of the kind was apparently said. On the other hand one would have expected the accused to have said to the doctor, 'Why are you worried about the prescription?' He, in turn, said nothing of that kind to the doctor. The mistake was perpetuated on the telephone; what was required was 500 milligrams Aralen to be taken as directed and the accused had before him the bottle giving the strength of these tablets that he had made up, and having repeated that strength to the doctor on the telephone—on his own version, he still did not realize that a mistake had been made. It seems to me that the accused has no right in this regard to seek to be exonerated by reason of what transpired during the telephone call from the doctor. The fact remains that on that occasion the accused made a second mistake. If the doctor, due to a misunderstanding, or because he misheard, also made the same mistake, it does not seem to be relevant in so far as the accused's negligence is concerned.

I have no hesitation in finding that in making up this prescription in the way he did, the accused was negligent. He has been unable to account for the manner in which he made the mistake but it was obviously due to the negligence and I have no hesitation in finding that that negligence was in fact the effective and proximate cause of the death of the deceased.

The accused is accordingly found guilty as charged.

(The accused was sentenced to a fine of £35 which was paid).

A CASE OF CYCLOPIA

WITH SPECIAL REFERENCE TO THE ENDOCRINE GLANDS

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Ballantyne[1] states that cyclopia (or synopsia) is a comparatively common monstrosity in the human subject but not as frequent as anencephaly. One must bear in mind, however, that monsters are rare in the human being. In the lower animals cyclopia has a surprising frequency. This condition has attracted attention since ancient times, since when a voluminous literature has arisen. Ballantyne, Adelmann[2], Scwalbe[3] and many others have given extensive and excellent reviews of the subject and have discussed in full the possible etiological factors responsible and the theories regarding the embryology which is involved. Birnbaum[4] states that foetuses presenting this deformity are incapable of living long as a result of the maldevelopment of the brain, although some have lived for weeks and months. One is said to have lived for 10 years, but the severity of the lesion is not stated. According to Ballantyne, both in the human subject and

among lower animals, cyclopia is more common in the female than in the male.

The term cyclopia is a good enough nickname but, as pointed out by Willis[5], gives no indication of the many other structural anomalies that are always present, in the eye itself, the nose, the bones of the skull and nervous system. Associated malformations are frequent, and Ballantyne gives a long list of various anomalies that have been seen along with cyclopia. One of the most frequent is the reduction or absence of the lower jaw.

Willis refers to the ductless glands and states that Zander[6] observed that some cyclopic foetuses had hypoplastic adrenals, as in anencephaly. Edmonds[7] found small adrenals and small thyroids in 3 cyclopes in which the pituitary gland was missing, while in 2 cyclopes with pituitary glands, the adrenals and thyroids were normal. In this particular case a macroscopic and microscopic examination of the endocrine glands in particular was undertaken.

CASE HISTORY

A female cyclopic foetus was received. No case history or the gestational age of the foetus was available (Figs. 1 and 2).

The facies was typically cyclopic with one median eye, and a proboscis-like nose above

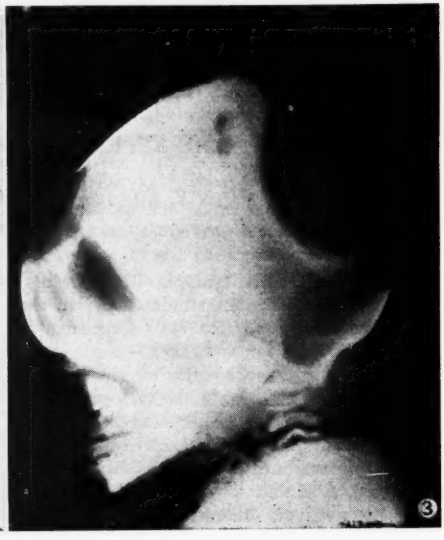

Fig. 1. Photograph of the cyclopic foetus.

Fig. 2. Side view of the face and head.

Fig. 3. Lateral X-ray view of the skull. Note the large defect in the occipital bone. The facial bones are grossly abnormal.

the eye. The jaws appeared to be comparatively normal. The head was large and was quite soft over the upper occipital region and the posterior vault. X-ray of the skull (Fig. 3) showed a large defect of the occipital bone, which was confirmed when the skull was opened. The upper and lower jaws were present, but the rest of the facial bones were grossly abnormal. No other external abnormalities were seen. The sitting length of the foetus was 29.3 cm. and the foot length 6.2 cm. X-ray of the lower limb showed ossification of the calcaneus and talus but no evidence of ossification in the cuboid or lower end of the femur. These findings would fit in with a 7–8 months' old foetus.

No foetal weight was available prior to the injection of fixative fluids.

GROSS ANATOMICAL FINDINGS OF THE THORACIC AND ABDOMINAL ORGANS

There were no naked-eye abnormalities of the lungs and heart. The liver was normal. The spleen was very large, with a small accessory spleen. The caecum and appendix were situated under the left lobe of the liver. The whole of the large intestine retained its mesentery. The kidneys were rudimentary; the left was the size of a 1 cm. bean and the right the size of a small pea. The female genital organs appeared to be normal. The kidneys, ovaries, uterine tubes and uterus were removed for histological section and stained with haematoxylin and eosin.

The Central Nervous System (*Figs.* 4 *and* 5). A hydrocephalic sac containing straw-coloured fluid filled the cranium. On incising this a grossly abnormal brain was found below it. The cerebral hemispheres were fused in a single mass with a single open ventricle. The cerebrum was one quarter or less of the normal volume. The convolutions and fissures were very slightly marked, but numerous blood vessels were present. The corpus callosum, falx cerebri and the greater part of the diencephalon were absent. The corpora quadrigemina, pons and cerebellum were well developed and perhaps even larger than usual. The medulla oblongata and the spinal cord had a normal appearance. The olfactory and optic nerves were absent. A miniature cyst-like diverticulum was seen in

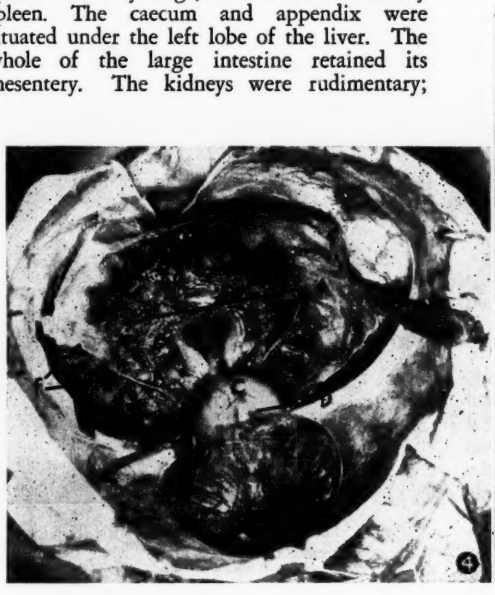

Fig. 4. Photograph of the brain *in situ* after the sac containing cerebrospinal fluid was opened.
A: Cerebral hemisphere. D: Aqueduct of Sylvius.
B: Open ventricle. E: Cerebellum.
C: Mesencephalon. F: Wall of the hydrocephalic sac.

Fig. 5. The brain after removal from the skull.
A, C: Cerebral hemisphere. X: Aqueduct of Sylvius.
B: Open ventricle. E: Cerebellum.
D: Mesencephalon. F: Spinal cord.

the position where the optic nerves are usually situated. The other cranial nerves were all bilaterally present. The pineal gland was absent.

The Eye. The eyelids were fused and bounded a lozenge-shaped opening which remained open. A single median eye was present with macroscopically a single lens and a thread-like structure in the position of the optic nerve. Microscopically the cornea, sclera, choroid and pigment layer of the retina could be identified. The retina showed rosette formation of the inner layer (Fig. 6).

The Endocrine Glands. The pituitary could not be found macroscopically. The tissue in the midline between the cavernous sinuses was scraped out down to the nasopharynx and serially sectioned. Histologically a tubelike structure was identified in the sections nearest the brain suggestive of a neurohypophysial rudiment (Fig. 7); no trace could be found of an adenohypophysis.

The thymus was present but appeared smaller than usual. Histologically the cortex and medulla could be identified with Hassalls' corpuscles in the medulla; the cells appeared to be less closely packed than usual.

The thyroid was present but it was small and appeared haemorrhagic. Serial sections were made for parathyroid tissue. Large distended blood vessels were obvious. Thyroid vescicles could be identified, with only a few containing colloid (Fig. 8). Valdes-Dapena[5] points out that the thyroid undergoes autolysis very quickly and, when it does, the lining epithelial cells seem to fall together, and the colloid disappears from view. Certain areas resembled parathyroid tissue but could not be identified with certainty.

There was no macroscopic evidence of foetal adrenals. The loose fat and areolar tissue above the kidneys were removed and serially sectioned. Histologically several small nests were found with large cells resembling ganglion cells (Fig. 9). On the one side the material removed showed a large conglomeration of tissues including renal tubules, glomeruli, coelomic epithelium and one very small nest of cells closely resembling adrenal cortical cells (Fig. 10). This was the only evidence of adrenal cortical tissue found.

The pancreas appeared to be normal in appearance. Histologically (Fig. 11) the acini could clearly be recognized. Islet tissue was present although in some areas it was doubtful whether it was true islet tissue or disintegrating acini.

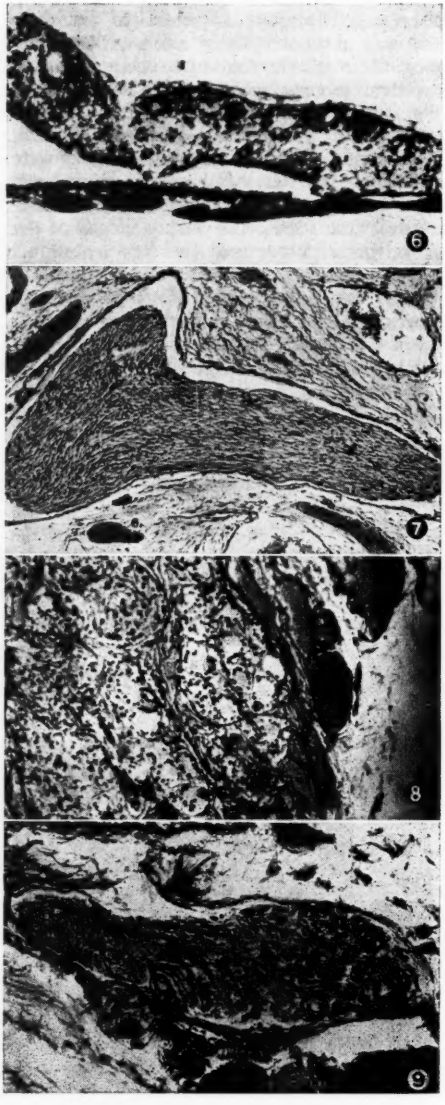

Fig. 6. Histological section of the retina showing rosette formation. (× 744).

Fig. 7. In the histological sections taken for evidence of pituitary tissue, a tubelike neural structure was seen. (× 384.)

Fig. 8. Histological section of the thyroid gland. (× 640.)

Fig. 9. Histological section of tissue removed above the kidneys containing ganglion cells. (× 960.)

The naked-eye appearance of the ovaries was within normal limits. Histologically no primary follicles were present, only germ-cells (Fig. 12). The rest of the genital tract showed no abnormalities.

The kidneys were histologically abnormal with fewer glomeruli, of which some were grossly distorted.

DISCUSSION

The brain in this particular case conforms to the brain pattern found in the cyclopic as described by Potter[9], Ballantyne and Adelmann. There was a total agenesis of the rhinencephalon. The diencephalon was extremely poorly developed, hence the absence of the structures associated with the diencephalon, viz. the pineal gland, the pituitary gland and the optic nerves. The small diverticulum and the thread of tissue where the optic nerve should have been, probably represent an abnormal median optic vescicle which grew out and became invaginated as the optic cup and induced the formation of the lens (Waddington)[10]. The abnormal optic cup subsequently gave rise to the abnormal rudimentary retina showing rosettes. Potter states that in most cases the retina shows rosettes and an abnormal proliferation of tissue which produces a pattern resembling that found in retinoblastomas. Mall[11] discusses cyclopia in the human embryo and describes a case of cyclopean eye and its appendages in a Janus monster. His description very closely resembles this particular case, viz. a single eye with bilateral cranial nerves III, IV, V and VI. In his diagram a median line anastomosis is shown of these nerves.

The absence or presence of the pituitary gland might very well depend on the extent of development of the diencephalon. In this case the pituitary was absent, and only after serial sections could a small piece of tissue be found resembling neurohypophysis. In Edmonds' cases of cyclopia in which the pituitary was present it consisted entirely of anterior lobe without neural components. The hypophysis is formed from two separate primordial parts which unite secondarily. According to Patten[12] primary relations of the structures involved are best seen toward the close of the fourth week. One of these primordia, known as Rathke's pocket, is an extension of the stomodeal depression, the origin being external of the oral membrane. The other primordium is the infundibular process, which is formed in the floor of the diencephalon and eventually, with very little change, becomes the pars neuralis of the adult hypophysis. The stomodeal portion becomes moulded into a double-layered cup about the pars neuralis. Both primordia are of ectodermal origin. One might postulate that the normal development of the adenohypophysis depends on induction by the neurohypophysis or, conversely, that a non-development of the adenohypophysis from Rathke's pocket might lead to a failure of the development of a normal neurohypophysis. Angerine[13] found the anterior lobe of the

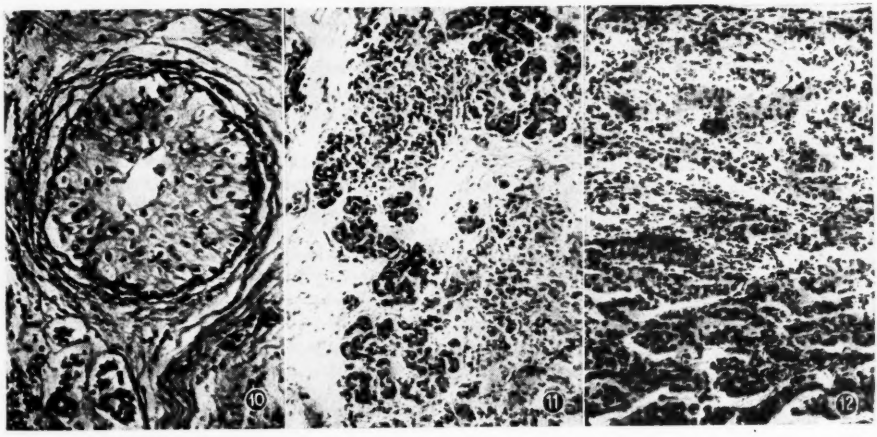

Fig. 10. Histological section of tissue removed above the one kidney containing an isolated nest of adrenal cortical cells. (× 960.)
Fig. 11. Histological section of the pancreas. (× 614.)
Fig. 12. Histological section of the ovary. (× 819.)

hypophysis present in all 20 anencephalic monsters examined; the pars intermedia was found in 6 and the pars nervosa in 5. He does not state whether the condition of the brain development was the same in each case and makes no reference to the state of development of the diencephalon.

According to Edmonds, cyclopic foetuses lacking a pituitary have shown reduction in the adrenal cortex comparable to that described in anencephaly, as well as smallness of the thyroid but without histologic changes. In cyclopic foetuses in which the anterior lobe of the pituitary was present, however, the development of the adrenals and thyroids was normal. He states that these data support the hypothesis that the placenta is not permeable to the hormones of the anterior lobe of the pituitary, and that the pituitary-thyroid interrelationships demonstrated in postnatal life are also active in the foetus. Windle[14], discussing the foetal hypophysis, states that experiments seem to show that there is very little if any transmission of the large molecules of the anterior lobe gonado-tropic factor even in the haemo-endothelial type of placenta. The foetal hypophysis seems to be capable of elaborating several active principles. Kitchell and Wells[15] support this view. Decapitation in foetal rats led to retarded growth of the adrenals, and the effects of 'hypophysectomy' could be prevented in decapitated foetuses by injecting ACTH. They therefore concluded that the foetal rat pituitary secretes ACTH which stimulates the development and secretion of the adrenal cortex. Willis states that there is ample evidence that the mammalian foetal pituitary gland commences to secrete several of its hormones at an early stage of development, that some of these affect the development of other ductless glands, and that the onset of function corresponds fairly well with the appearance of cytological differentiation in the anterior pituitary. According to Keene and Hewer[16] the foetal pituitary contains an active principle at 8 weeks, which makes it the endocrine gland showing the earliest activity, according to their data.

Domn and Leroy[17] concluded from foetal hypophysectomy in rats that growth of the developing rat foetus is not appreciably affected. The adrenals showed the greatest effect, being smaller than the controls. As regards the gonads and sexual differentiation, no conclusive evidence of a hormonal deficiency was found. Foote and Foote[18] described the changes in hamster thyroid glands following decapitation; in this group the thyroid was smaller with fewer follicles. Tobin[19] came to the conclusion that total destruction of the adrenals in foetal rats does not inhibit the prenatal development of the reproductive organs. Moore[20] discusses the rôle of the foetal endocrine glands in development and gives an extensive review of the subject. He states that, in the first place, the influence of hormones during development cannot be expected to occur until the endocrine organs themselves have attained a developmental stage which permits active manufacture of hormones; secondly, that the physiological conditions within an organism must have reached a stage of development which permits release of the hormone from the gland and provides for sufficient hormone distribution to bring the target organs under its influence; and thirdly, that the target organs themselves must have attained a sufficient degree of differentiation to permit their effective response to the activating substance. He stresses, however, the complex and unsatisfactory state of the problem when all the evidence is considered.

In this particular case under discussion the adenohypophysis was completely absent, with the probability of traces of a neurohypophysis. The adrenals were likewise macroscopically absent and only a minute nest of cortical tissue was found with more evidence, however, of medulla anlagen. The thyroid and the thymus were smaller than usual. The pancreas was apparently normal. The question can well be put whether the lack of development of the pituitary was the direct cause of the non-development of the adrenals or whether there was a common factor or factors involved in the agenesis of these organs, including the kidneys.

Peter *et al.*[21] describe 3 stages in the development of the embryonic ovary: firstly, the *Fetaler Typ*, secondly the *Intermediarer Typ*, and thirdly the *Jugendlicher Typ*. The third type is seen from the eighth foetal month.

According to Potter the most mature cells in the ovary are those furthest removed from the surface. Very early in foetal life some of the cells in the central position of the gonad enlarge and become identifiable as oögonia. A layer of small flat cells envelops each germ cell, and structures identical with the primordial follicles of later life are produced.

Sauramo[22] made an extensive study of the ovary from the embryonic period to fertile age. He states that a 19 cm. foetus was the first to show some primordial follicles in the central part of the ovary. In the ovaries of the 6-month-old foetus primordial ova could no

longer be detected; there were only primordial follicles in the cortex.

In this particular case no typical primordial follicles were seen, only primordial ova. According to the available data this foetus should not be younger than 7 months. In view of what has been said, this suggests a retarded development of the ovaries. Potter points out that it is generally stated that the growth of follicles beyond the primordial stage is a direct result of stimulation by maternal hormones, but this cannot be entirely true because follicles continue to develop throughout infancy and childhood. The total absence of the pituitary might have been the cause of the lack of primordial follicle development.

In conclusion, if one accepts the concept postulated by several workers regarding the rôle of the foetal hypophysis, then the total absence of the pituitary gland could account for the lack of development of the adrenal, which normally consists of 2 separate embryological anlagen, the medulla and the cortex. Small anlagen of both medulla and cortex were found, but it might well be that the pituitary plays a rôle in the further stages of development when the separate embryological anlagen join and develop as a single organ in man. The small but relatively normal thyroids indicate, as was pointed out by Jost,[23] that the hypophysis is probably not necessary for the first establishment of the thyroid structure and function but that it controls from a certain stage onwards the intensity of function. The lack of development of the primary follicles of the ovaries might indicate that the pituitary is not essential for the early stages of development of the ovary but that the foetal pituitary is probably necessary for the development of the primary follicles, provided one can assume that the maternal hormones are normal in the case of a cyclopic embryo and that there has been no abnormality in extraneous hormones; the maternal foetal hormonal balance must be borne in mind.

This particular case also confirms what Jost points out in his concluding remarks, viz. that foetal growth is not dependent on foetal hormones and that, even with complete absence of the hypophysis, growth has proceeded apparently normally. On the other hand it is also plain that a normal-sized newborn is not necessarily normal either structually or functionally.

I wish to thank Dr. J. P. v. Wyk of Jan Kempdorp for sending the foetus to the Department of Anatomy. I am also indebted to the Radiological Department of the Pretoria General Hospital for the X-ray photographs of this specimen and to Dr. P. v. Mihálik for assistance with the photomicrography.

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NOTES AND NEWS : BERIGTE

Dr. J. J. Reyneke, M.B., B.Ch., D.A. (Rand), has commenced practice as a specialist anaesthetist in partnership with Dr. Kris H. Jooste at 303 Osler Chambers, Jeppe Street, Johannesburg. (Telephones: — *Rooms*: 22-6183; 22-9728; *Residence*: 46-4827).

STUDENTS' MEDICAL COUNCIL (UNIVERSITY OF THE WITWATERSRAND) 18TH ANNUAL CONFERENCE

This conference will be held at the Medical School, Johannesburg, from 22–26 May 1961.

The theme of the conference is *Blood Dyscrasias*.

MEDICAL GRADUATES ASSOCIATION: JOHANNESBURG

DIARY OF EVENTS: APRIL 1961

All doctors are cordially invited to attend all Meetings and Ward Rounds.

27 April 1961 *Rand Medical Discussion Circle*, at the Harveian Lecture Theatre, Medical School, at 8.15 p.m. Subject to be announced later.

25 April 1961 College of General Practitioners, at S.A. Blood Transfusion House, at 8 p.m. Annual General Meeting.

19 April 1961 Edenvale Hospital, at 8.15 p.m. Lecture by Dr. G. Lange: *Demonstration of Clinical Cases*. Dr. G. I. Frank: *The Laboratory Physician*.

18 April 1961 Medical Association of S.A. (Southern Transvaal Branch) at Medical House, 5 Esselen Street, at 8.15 p.m. Dr. P. Menof: *The Thyroid and Essential Hypertension—Recent Experience*.

Clinical Ward Rounds

Mondays	General Hospital. Ward 14. Medical. 9 a.m.
Tuesdays	General Hospital. Ward 14. Medical. 9 a.m.
Tuesdays	General Hospital. Ward 22. Surgical. 8 a.m.
Tuesdays	General Hospital. Ward 22. Surgical. 8.30 a.m
Tuesdays	General Hospital. Ward 12. Medical. 10.30 a.m.
Wednesdays	General Hospital. Ward 3–4. Professorial Staff Round. 9 a.m.
Wednesdays	General Hospital. Ward 14–15. Medical. 9 a.m.
Thursdays	General Hospital. Ward 22. Surgical. 8 a.m.
Thursdays	General Hospital. Ward 5. Medical. 10 a.m.
Fridays	General Hospital. Ward 28. Psychiatric. 9.15 a.m.
Fridays	General Hospital. Ward 14–15. Medical. 9 a.m.
Thursdays	Fever Hospital. 8.30 a.m.
Fridays	Edenvale Hospital. Ward 7, European or Ward B, non-European. 12 noon.
Fridays	Coronation Hospital. 2 p.m.
Saturdays	Princess Nursing Home. 2nd Floor. Neurology. 9 a.m.
Tuesdays	Florence Nightingale. 2nd Floor. Thoracic Unit. 8–9.30 a.m.
Saturdays	Florence Nightingale. 2nd Floor. Thoracic Unit. 9.30–10.30 a.m.
Tuesdays	Baragwanath Hospital. Lecture Theatre. Surgery. 1.30–2.45 p.m.
Tuesdays	Baragwanath Hospital. Ward 17. Paediatrics. 4–5 p.m.
Thursdays	Baragwanath Hospital. Lecture Theatre. Cardiology. 2–3 p.m.
Fridays	Baragwanath Hospital. Lecture Theatre. Medicine. 2–3 p.m.

Fortnightly Meetings

Tara Hospital, Lecture Room, at 9 a.m.

Wednesdays

26 April 1961 *Prominent Features of Modern German-Speaking Psychiatry*. By Prof. J. E. Meyer, of Munich.

Rehabilitation Association for Injured Workmen, Brenthurst Clinic, Room 19, 3rd Floor, 5.15 p.m.

11 and 25 April.

Weekly Meetings

S.A. Institute for Medical Research: Lecture Theatre at 5.15 p.m.

Mondays

10 April 1961 *Problems on the Epidemiology of Relapsing Fever In Africa*. By Dr. Zumpt.

17 April 1961 *Spread of Primary Brain Tumours*. By Dr. J. C. E. Kaufman.

24 April 1961 *The Biochemistry of Insanity*. By Dr. J. S. Harington.

Department of Surgery: Surgical Forum, Harveian Lecture Theatre at 5.15 p.m.

Tuesdays

11 April 1961 *Facial Pain*. By Prof. A. E. Dodds.

18 April 1961 *The Peripheral Circulation*. By Dr. B. Goldberg.

25 April 1961 *Results of Perforator Vein Ligation*. By Mr. J. Allan.

Saturdays. Hospital Lecture Theatre: Vascular Clinic at 8 a.m.

Saturdays. Hospital Lecture Theatre: Surgical Conference at 9.15 a.m.

Saturdays. Ward 10. Urology Staff Conference at 10.15 a.m.